

TITLE

**A METHOD AND A DEVICE FOR PROCESSING AND SEPARATING
AN IMBRICATE FORMATION OF FLEXIBLE, FLAT OBJECTS**

CLAIM OF PRIORITY

[0001] This application makes reference to, incorporates the same herein, and claims all benefits accruing under 35 U.S.C. §119 from my application *A METHOD AND A DEVICE FOR PROCESSING AND SEPARATING AN IMBRICATE FORMATION OF FLEXIBLE, FLAT OBJECTS* filed with the Swiss Federal Institute of Intellectual Property on 12 September 2002 and there duly assigned Serial No. 2002 1554/02.

BACKGROUND OF THE INVENTION

Technical Field

[0002] The invention relates to a method and to a device for processing and separating an imbricate formation of flexible, flat objects, in particular, printed products, according to the preamble of the independent claims.

Prior Art

[0003] From the state of the art there are known various feeders and devices, specifically in order to isolate printed products or to grasp these individually and to transfer these for further transport to a conveyor means. The disadvantages of the state of the art are due to the

1 counter-running movement pattern, the large inertia and friction forces and abrupt direction
2 change. With the machines used today the operations are not flowing, but have a static component.
3 This means that a printed product to be processed is brought completely to a standstill in order then
4 to be accelerated abruptly in another direction. This has a negative effect, particularly it high
5 processing speeds.

6 **[0004]** From CH 324210, there is, for example, known a feeder machine. for the paper industry.
7 This serves for feeding folded printed sheets onto saddles of a feeder transport belt of a binding
8 machine. The device is based on a drum which is arranged between a stack of folded printed
9 sheets supported on an oblique plane and a transport belt with saddles. The printed sheets are
10 arranged standing on the fold in the feed region. The drum which is arranged essentially
11 tangentially to the frontmost printed sheet on its periphery comprises a gripper by way of which
12 the respective frontmost printed sheet of the ply is gripped and pulled off at the cut-edge side. The
13 pulling-off of the next printed sheet is only possible if the previous one has been completely
14 removed from the stack. Each printed sheet is deflected bearing on the drum and thrown off onto
15 a saddle of the feed transport belt. With this device in each case only one printed sheet is
16 processed per operating cycle which results in a limitation of the processing speed due to the basic
17 operating principle. So that the printed sheet may be grasped it is furthermore necessary for the
18 drum of the gripper to carry out a counter-directed movement. With fast-running machines, this
19 leads to high inertia forces. Due to the functioning principle on which it is based, this device is
20 not suitable for processing large volumes and furthermore the separation at the cut-edge side is

1 burdened with problems.

2 **[0005]** DE 2531262 shows a feeder for sheets or folded layers of paper or similarly flexible
3 materials. Printed sheets, in the form of an imbricate flow (leading edge at the top) are moved
4 along an oblique plane by way of a conveyor belt. The printed sheets on a further oblique plane
5 are piled up into an obliquely set position and brought to a standstill. The respective lowermost
6 printed sheet of the oblique ply is grasped by way of a wheel equipped with grippers and deflected
7 by way of a deflection roller. By way of this, the printed sheets are pulled from the obliquely set
8 position. In contrast to the device known from CH 324210, the printed sheets are not pulled off
9 individually but in the form of a continuous, imbricate flow. Due to the large deflection during
10 the pulling-off the printed sheets are greatly loaded. For isolating the printed sheets there is
11 suggested an acceleration path arranged after this.

12 **[0006]** EP 1055620 of the same applicant shows a device for accommodating and for the further
13 transport of flat, printed products. A multitude of grippers with associated suction members are
14 attached along a revolving wheel. The printed sheets to be processed are arranged on a stack from
15 which they are lifted by way of the suction members and brought into the active region of the
16 grippers. The printed sheets are gripped by the grippers and subsequently deposited in the form
17 of an imbricate flow and conveyed away by way of a conveyor means. This device permits the
18 gripping of printed sheets in very short distances, wherein the suction heads and products are to
19 be aligned to one another.

1 **[0007]** EP 1096914 of the same applicant shows a device for the transport of flat products from
2 a stationary stack positioned in a receiving location to a dispensing location. The device comprises
3 a separating member, as well as a support element and a holding member which are arranged
4 running around a shaft. The products are gripped individually, separated and transferred to a
5 means which serves for the conveying-away. With this device the products are also mechanically
6 loaded.

7 **[0008]** WO 00/46135 of the same applicant shows a device for reducing a stack of flat objects,
8 in particular, printer's products. By way of a lifting means, the respective uppermost printed sheet
9 is lifted from a stack and brought into the active region of a conveyor belt which serves for leading
10 away the printed sheets in the form of an imbricate flow. The device is designed such that it is
11 adapted to the height of the stack. Although it is simplified in comparison to the state of the art,
12 one however requires a control.

13 **[0009]** EP 0863099 of the same applicant shows a device for isolating stacked printer's products.
14 The printed sheets to be processed are inserted below a stack by way of a conveying means. From
15 this stack the respective uppermost printed product is gasped by a gripper and led away
16 individually. So that the printed sheets may be gasped they are individually lifted by way of a
17 lifting means and brought into the active region of the gripper.

18 **[0010]** EP 0755886 of the same applicant shows a device for feeding folded printer's products

1 to a location for further processing. Printed sheets supplied in an imbricate flow are led to a
2 stacking location by way of a conveying means, where they are inserted below an intermediate
3 stack. By way of a lifting member moved along a circumferential path (suction member) the
4 respective uppermost printer's product is lifted at the fold edge and brought into the active region
5 of a conveying-away device. The conveying-away device comprises a segmented roller and a
6 circumferential belt which serves for pressing the printed products onto the segmented roller. The
7 printed sheets are lifted one after the other and brought into the active region of the
8 conveying-away device by which they are grasped and led away in the form of an imbricate flow.

9 **[0011]** DE 19627830 of the same applicant shows a device for feeding printed products to a
10 conveying-away device. A suction member arranged in the inside of a rotor engages through a
11 recess in order to grasp a printer's product and with a corner region to bring this into the inside of
12 the rotor. The printer's product is then engaged at the bottom by a rotor arm and lifted further in
13 order to bring it into the active region of a conveying-away device. The printed products are
14 conveyed away individually or in the form of an imbricate flow by way of grippers.

15 **[0012]** EP 0675061 of the same applicant shows a device for the uninterrupted supply of flat
16 products to a dispensing location. The printer's products are led to a dispensing location by way
17 of an endless conveyor belt. At the dispensing location the conveyor belt, at least in regions, is
18 guided around a deflection roller and engages around the deflection wheel in an undershooting
19 manner. The conveyor belt driven by a stepper motor and a deflection wheel form a conveying gap

1 for the products to be processed which are arranged in an imbricate formation. The respective
2 uppermost product of a part stack is grasped by way of a suction head and lifted.

3 **[0013]** As may be deduced from the above-described documents, the devices known from the
4 state of the art for separating printer's products have a relatively complicated construction, wherein
5 the complexity is partly due to the control. Depending on the mentioned principles the processing
6 speed is furthermore limited so that the printed products are not loaded too greatly or the
7 processing steps are effected in a reliable manner. Most known devices are based on the fact that
8 the printed products for further processing need to be brought completely to a standstill so that they
9 may be grasped by a gripper or equivalent means. Inasmuch as a fluent processing is desired, in
10 the state of the art expensive designs, specifically controls are required in order to be able to
11 separate the printed products with a high accuracy. A further disadvantage of conventional designs
12 for a continuous processing, i.e., if the printed product is not to be brought completely to a
13 standstill lies in the fact that a (limited) buffering with short-term malfunctioning may only be
14 accommodated, in indeed if at all, by complicated sensories with control and regulation
15 installations. For this reason as well as others, most devices envisage a "static" intermediate stack
16 from which the printed products (previously braked to a standstill or almost to a standstill) are
17 accelerated, pulled off and isolated.

18 SUMMARY OF THE INVENTION

19 **[0014]** The object of the invention lies in providing a method and a device for the continuous

1 processing of an imbricate formation of flexible flat objects, specifically printed products, in
2 particular, for the exact separation and transfer of individual printed products from this imbricate
3 formation to a conveying member, which demand a comparatively low design, control and
4 regulation expense with regard to technology.

5 **[0015]** This object is achieved by the invention defined in the independent patent claims.

6 **[0016]** The invention is based on a flowing transformation of an imbricate formation of flexible,
7 flat objects, in particular, folded printed sheets, by way of a guide means. In the following one
8 only refers to printed products, wherein other flat objects may of course also be included by the
9 invention.

10 **[0017]** The printed products to be processed are preferably supplied in the form of an imbricate
11 flow with which the trailing edges, with folded sheets their fold, of the printed products or printed
12 sheets are arranged at the top and the subsequent printed products overlap. Such an imbricate flow
13 is fed to the guide means which serves for reforming the imbricate flow in angle, alignment and
14 density so that there results a new imbricate formation. Independently of whether the fed printed
15 products are arranged as a stack, a ply or imbricate flow, before separation, they are transferred by
16 suitable means into the mentioned standardized imbricate formation according to the invention
17 With folded printer's products, in contrast to the state of the art, the fold is preferably arranged at
18 the top and the folded sheet is supported on its cut-edge side, so that the folded sheet may be

1 grasped at the fold individually or in a defined number. The invention thus accordingly permits
2 the processing of a column., a stack or other formations while using the same methods according
3 to the invention for separating the printed products, i.e., that the products need not necessarily be
4 fed as a imbricate flow. Where appropriate thus the standing products e.g., of a column are
5 transferred into the desired obliquely lying position, whereas with an imbricate flow, as described
6 above, an alignment of the: printed products is required. Folded sheets if required are previously
7 sorted such that they are directed with their cut-edge side orientated downwards.

8 **[0018]** Embodiment forms of the invention shown here may have a modular construction with
9 which several modules may be interactively connected via standardized interfaces. A preferred
10 embodiment form comprises a take-over module, transfer module and a conveyor module arranged
11 after this for removal of printed products. The take-over module serves for bringing the printed
12 products which where appropriate are fed in a different form and arrangement [imbricate] scaling,
13 ply, pile, or stack) into a suitable, standardized initial position which is fed to the transfer module.
14 The transfer module in particular serves for transforming the printed products by way of a guide
15 means according to the invention into an initial position which is optimal for the removal.. By way
16 of the subsequently arranged conveyor module individual or a defined number of separated printed
17 products are removed and conveyed away. With the conveyor module it is for example the case
18 of a revolving tension member or removal drum equipped with grippers.

19 **[0019]** In the transfer module the printed products are led actively or passively via a plane,

1 concavely or convexly curved or angularly bent guide surface of a guide means. Connecting to the
2 end region of the guide surface or the transfer module there is arranged a conveyor means which
3 serves for removal or for separating and leading away the individual printed products. The printed
4 products are led in an imbricate formation with the trailing edge (at the top), onto the guide surface
5 and guided along this. A preferred embodiment form of a guide means comprises a guide surface
6 on whose end there is arranged an essentially perpendicularly projecting edge which serves for the
7 controlled retention and alignment of the elements of the imbricate flow. In contrast to the devices
8 known from the state of the art the device according to the invention permits a dynamic processing
9 of the printed products. At the same time one does away with the basic change of direction which
10 has a negative effect on the processing procedure and the processing speed. The elements are
11 processed in a fluent manner and above all without a disadvantageous loading of the printed
12 products, which means that in alignment and arrangement they are transformed and separated in
13 a gentle and continuous manner. Of course, the invention may also include a passive removal, that
14 is to say the separation and isolation is effected via the transfer module itself and the separated
15 printed sheets or groups of printed sheets are transferred to the removal unit which does not have
16 a separating function.

17 **[0020]** Today's known functioning principles demand that the printed products are transferred
18 supported practically in a lying or flat manner. In contrast to this, the printed products with the
19 device according to the invention are aligned by way of the guide means such that in the transfer
20 region of the guide surface, they line up and are separated in an obliquely erect, largely freely

1 accessible position, In contrast to most solutions known from the state of the art this furthermore
2 has the advantage that the separating procedure does not necessitate a printed product having to
3 be completely separated before the separation of the next printed sheet. At the same time with
4 folded printed sheets, the fold is directed upwards, that is to say away from the guide surface so
5 that the printed sheets individually or in a defined number by way, e. g., of a gripping means may
6 be grasped simply and with great accuracy. The printed products with processing amongst one
7 another and with the guide means display a favorable mutual influencing and stabilization with
8 respect to the method, which is of particular relevance to the procedure in the end region of the
9 guide [metal] sheet.

10 **[0021]** Several printing products bearing on one another, due to their specific properties and the
11 arrangement, specifically their flexibility and mutual displacability, in their entirety, display an
12 elastic and flexible behaviour. A first form of elastic behaviour is to be observed with a bundle of
13 printed products which is placed on a plane and is held by abutments and limitations. If the
14 limitations of the printed product bundle in the longitudinal direction are pulled apart, the angle
15 between the printed products and the plane becomes shallower. If the limitations of the bundle
16 however are pushed together, the angle between the plane and the printed products becomes
17 steeper. Understood in this manner, this behavior is elastic. A further form of elastic behaviour
18 in particular is to be observed with an arrangement of folded printed products. On account of the
19 fold, the individual printed products tend to curve up or to open in regions. But also with other
20 flexible products or printed products such flexibility is given on account of material unevenness

1 and enclosure of air. This has the result that a corresponding stack or a corresponding ply of
2 printed products may be elastically pressed together. A stack of folded newspaper sheets may for
3 exam ple be considerably pressed together. It has been shown that in a guide means according to
4 the invention, given a suitable relative arrangement and alignment of the printed products, to be
5 aligned, this behaviour be used to achieve a compensation and buffer effect. This buffer effect to
6 a certain extent acts as a dynamic intermediate storage (as a result of local compression) and
7 geometric compensation on processing. This effect here is used in a targeted manner in order to
8 compensate differences in the processing speed between device means conveying to and away, or
9 to compensate short-term malfunctioning.

10 **[0022]** So that the above-described effects may be exploited, the guide surface used in the guide
11 means preferably has a shape which leads to a compacting of the imbricate formation of printed
12 products guided above it, and simultaneously leads to them being erected (or inclined) in a
13 controlled manner. Guide surfaces which have a plane section which merges into an arc-shaped
14 or straight section running obliquely downwards are particularly suitable.

15 **[0023]** In order to separate the printed products, a limitation is present at the end of the guide
16 surface e.g. in the form of a mechanical abutment, which prevents a further leading of the printed
17 products of the compacted imbricate flow along the guide surface. The printed products are
18 dammed and aligned in a controlled manner in the active region of the mechanical abutment. On
19 alignment into a vertical position, due to the shifting of the center of gravity of the printed

1 products, the laterally acting gravity force continuously reduces so that the printed products come
2 into an unstable equilibrium and then have the tendency to flip over. Roughly at this moment then
3 they come into the active region of the conveyer means, which grips them and leads them away
4 individually. With alternative embodiment forms here there may be included a special separating
5 device which transfers the printed sheets to a subsequent conveyor module.

6 **[0024]** In order to support the isolation of the printed products, in certain cases it is useful to
7 provide a means for the active changing of the inclination of the printed products in order to feed
8 the printed products to the conveyor means in a controlled manner at the moment at which they
9 tend to tip over. With this, it may be the case for example of a rotating, plane or structurized roller
10 or a revolving cam belt, by way of which the printed products are influenced by friction, a positive
11 or non-positive fit. According to the field of application, rollers equipped with suction elements
12 or wing compartment wheels which engage between the printed products and thus feed these
13 dynamically to the conveying means are also suitable. A controlled flow of air is likewise suitable
14 which acts on the printed products from the side or from above. A further form of a means
15 supporting this peeling-off or tipping procedure, here called folding-over or separating means
16 comprises a lever on whose one end there is attached a suction cup. The lever is rotatably mounted
17 about a pivot pin, wherein the fulcrum of the pivot pin is arranged on the region of the mechanical
18 abutment at the end of the guide surface. The respective frontmost printed product which prevails
19 at the mechanical abutment (brim) is pressed against the lever or suction cup. In order to transfer
20 this first printed product then to the conveyor means, the lever and with it the printed product held

1 by the suction cup is tilted in a relatively rapid manner so that the product is tilted relatively
2 quickly so that the printed product stands freely and may be grasped by the conveyor means. The
3 remaining printed products remain standing a result of their inertia or held by mechanical
4 abutments. It is possible without further ado to also effect the removal or the conveying-away by
5 way of revolving roller pairs, conveyor belts or alternative conveyor means.

6 **[0025]** The distance between the guide surface and the conveyor means, or the folding-over
7 means is preferably adjustable so that the device is suitable for processing printed products of a
8 variable format. A further advantage of the invention lies in the fact that at the location of the
9 separation and when required one may provide a points [switch] system so that the printed sheets
10 directly after the transfer module may be transferred to various conveyors or may be removed by
11 these.

12 **[0026]** The device, particularly on the guide surface may comprise additional active means
13 which serve the control of the flow, the density and the shape of the imbricate flow. With these
14 guide means it is the case, for example, of one or more revolving guiding belts (conveyor belts)
15 which by way of friction act on the flow behaviour and folding-over of the printed products. The
16 guide means are arranged along the whole guide surface or only in sections. According to
17 requirement they have the same or different conveying speeds and are directed equally or counter
18 to one another. The, oblique position of the printed products is suitable in order to obtain a buffer
19 and compensation effect, which, for example, serves for compensating fluctuations in the

processing speed.

[0027] In particular in the region of the guide surface or of the guide means one may provide stabilizing means which on starting the device or in the case of a disturbance stop or “freeze” the dynamic process. With these means it is the case preferably of a gripper, lever or flaps which when required engage into the flow of printed products to be processed and support and stabilize these in angle and alignment. These stabilizing means may be arranged movable so that at least for a certain stretch they may be co-moved with the flow of the printed products. Telescopically extendable flaps or rods are particularly suitable for starting and stopping the processing procedure. The stabilizing means may form a part of the device or be arranged separately.

BRIEF DESCRIPTION OF THE DRAWINGS

[0028] A more complete appreciation of the invention, and many of the attendant advantages thereof, will be readily apparent as the same becomes better understood by reference to the following detailed description when considered in conjunction with the accompanying drawings in which like reference symbols indicate the same or similar components, wherein:

[0029] Fig. 1 illustrates a first embodiment form of a transfer device with a convex guide surface;

[0030] Fig. 2 illustrates a second embodiment form of a transfer device with conveyor belts;

[0031] Fig. 3 illustrates the embodiment form according to Figure 2 in a lateral view;

1 **[0032]** Fig. 4 illustrates a third embodiment form of a transfer device with essentially straight
2 sections;

3 **[0033]** Fig. 5 illustrates a fourth embodiment form of a transfer device with a convex guide
4 surface; and

5 **[0034]** Fig. 6 illustrates a further embodiment form with a transverse displacement of the printed
6 sheets directly before removal.

7 **DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENTS**

8 **[0035]** Figure 1 shows a first embodiment form of a guide means 1 according to the invention
9 in a lateral view. On a convexly curved guide surface 2 printed products 10 in an imbricate
10 formation 13 are led in the arrow direction P towards an edge (brim) 3 which is arranged at the end
11 of the guide surface 2 and which serves as a mechanical abutment for the printed products 10.
12 The printed products 10 lie with their cut-edge side 12 on the guide surface 2, wherein the fold 11
13 of the printed products 10 points upwards. Printed products which are distanced far from the brim
14 3 are located in an imbricate arrangement with which the fold 11 runs subsequent to the cut-edge
15 side 12. Printed products 10 which are located nearer the brim 3 in contrast are steeper, that is,
16 they are set standing obliquely. In contrast to the devices known from the state of the art the
17 transformation is effected in a fluent manner and is primarily effected by the interaction of the
18 printed products amongst one another and in particular by the geometry of the guide means. With
19 this the printed products 10 are fed to the guide means by way of a variously designable product
20 feed 14 according to the state of the art shown only schematically here, e.g., a conveyor belt.

[0036] The printed products 10 are moved forward in the context of the imbricate formation 13 along the guide surface 2 as a result of the force effect of the subsequent products and the inclination. Alternatively or supplementary to this, one uses active means (not shown in more detail in this figure), in particular additional conveyor belts. The guide surface 2 and the brim 3 influence the shape of the imbricate flow and the alignment of the printed products 10 in a targeted manner and in a manner such that the printed products 10 at the end of the guide surface 2 in the region of the brim 3 assume an optimal alignment for gripping, here by way of gripper 8 fastened oil revolving tension element 9, The brim 3 dams the flow of the imbricate formation 13, by which means the printed products 10 run onto one another in a controlled manner and are aligned as a result of the specific shape of the guide surface 2. The curvature and in particular the inclination of the guide surface 2 are designed such that one achieves a controlled erecting of the printed products 10. A further advantage of the curved guide sheet [metal] lies in the fact that the fold edges of the printed sheets, where appropriate with guide means engaging on the fold side, may be made almost straight. This in particular simplifies the arrangement and design of the means 5 for separating the printed sheets. According to the invention, the guide surface 2 accordingly at least in regions is inclined with respect to the horizontal so that the printed products in the conveying direction are subjected to a certain wedge effect and thus “compression” of the product flow. This inclination of the guide surface 2 with preferred embodiment forms is at least partly more than 30° with respect to the horizontal so that the desired aligning procedure of the printed products is effected. In the direct vicinity of the brim 3, the printed products are located with the fold upward (z-direction) in an essentially perpendicular position from which individually or in

1 a defined number they are transferred to the conveyor means, here the grippers, for leading away.

2 [0037] Above the edge 3 one may recognize folding-over means 5 which serves for the
3 controlled folding-over of the printed products 10. With the folding-over means 5, it is the case
4 here of a winged wheel 6 rotating about an axis A (perpendicular to the plane of the drawing) with
5 arms 7. The arms 7, as a result of the rotation of the winged wheel 6 engage between the printed
6 products 10 located at the end of the guide surface and have the effect that these are released or
7 peeled away in a controlled manner and are separated or isolated from one another in the region
8 of the fold. The printed products 10 separated from one another in the region of the fold 11
9 individually or in a defined number are brought into the active region of grippers 8, are gripped
10 by one of these grippers 8 and subsequently conveyed away. It may be easily recognized in Figure
11 1 that the folding-over means effects or supports a peeling away and subsequent "tipping-over"
12 of the respective printed product. According to the invention, the printed sheets on removal by
13 way of the folding-over means 5 are actively transferred into an obliquely standing position in the
14 conveyor direction. Although the procedure described here effects an optimal removal, with other
15 embodiment forms by way of the folding-over means 5 there may be effected a mere lifting for
16 removal, so that the term "folding-over means" is not to be understood in a limiting manner and
17 this may also be described as a separating means.

18 [0038] The distance D between the guide surface 2 and the folding-over means 5 or the gripper
19 8 may be adjusted so that one may process differently large elements. At the same time, the guide

1 surface may be inclined differently or displaced, or alternatively, the folding-over means 5 and the
2 removal means 8, 9 may also be arranged movable. With special embodiment forms, the
3 adaptation to various formats may also be envisaged by sensories with a suitable control and
4 regulation which accordingly automatically adjust the control elements (position and acting forces
5 of the folding-over means, removal means etc.).

6 **[0039]** Figure 2 shows a second embodiment form of a transfer device with a guide means 1,
7 in a lateral section. Conveyor belts 15 are arranged along the guide surface parallel to the flow
8 direction B of an imbricate formation (not shown here), and serve as guiding elements, for the
9 targeted acceleration or braking, in sections, of the printed products located on the guide surface
10 2. The alignment and the flow behaviour of die printed products are influenced in a targeted
11 manner by way of this. According to the field of application the conveyor belts 15 are supported
12 by air (e.g. fanning-open by pressure or retention by vacuum). The conveyor belts 15, when
13 required, may furthermore be driven in the same or in opposite directions.

14 **[0040]** The guide means 1, where appropriate, may be a changeable geometry, which at least in
15 regions permits a targeted setting of the curvature of the guide surface 2. Guide means 1 may thus
16 be adjusted to different printed products. By way of changing the curvature, one influences the
17 inclination, but also friction forces and thus the flow and damming behavior. A preferred
18 embodiment form comprises a guide means manufactured of sheet metal, which is (elastically)
19 deformed by a bending device, e.g., by way of an adjusting screw or hydraulics.

[0041] Figure 3 by way of arrows 16.1, 16.2, 16.3 schematically shows the influence of three conveyor belts 15.1, 15.2, 15.3 on the printed products 10 of the imbricate formation 13. The length of the arrows 16.1, 16.2, 16.3 by way of example illustrate the speed of the conveyor belts 15. As the arrows 16.1, 16.2 illustrate the conveyor belts 15.1, 15.2, 15.3 here are driven in the flow direction of the imbricate formation 13, wherein the second conveyor belt 15.2 has a higher speed 16.2 than the two other conveyor belts 15.1 and 15.3. By way of this, it is achieved that the printed products 10 in this region are accelerated at the cut-edge side in the direction of the brim 3. After the printed products 10 have left the active region of the second conveyor belt 15.2, they get into the active region of the third conveyor belt 15.3 where the printed product are braked at the cut-edge side. By way of this procedure, it is achieved that the printed products 10 are erected in a controlled manner. Other embodiment forms and drive concepts are also possible according to requirement. The conveyor belts 15 may be driven differently or regulated or controlled and different friction forces with respect to the conveyor belts 15 or guide sheet [metal] 2 may additionally influence the product flow.

[0042] The conveyor belts 15.1, 15.2, and 15.3 furthermore serve the control of the arrangement of the printed products, in particular on starting and stopping the device and in the case of malfunctioning. Erecting or pivotable flaps and grippers, here indicated by a flap 22 pivotable about an axis 23, in a supplementary manner or alternatively serve as a control and stabilizing means for the position and alignment of the printed products. When required, these means may be designed movable, and led subsequently to the product flow.

[0043] These conveyor bolts 15.1 to 15.3 support the procedure already described by way of Figure 1, with which the printed products 10 on supply to the guide surface 2 of the guide means 1 are conveyed lying in an overlapping manner, wherein the trailing edge of a printed product in each case lies over the leading edge of the subsequent printed product. During the transport over the guide surface 2, the printed sheets 10 are continuously erected so that on removal from the guide means 1 they have an obliquely standing position, with which the printed products are inclined slightly opposite to the conveying direction,

[0044] Figure 4 shows a third embodiment form of a guide surface 2. This is composed of three essentially straight sections 17.1, 17.2, 17.3. Due to the greater inclination of the second section, it is effected that the printed products 10 increasingly dam in the third section 17.3 and here are erected in a controlled manner. Due to the length of the guide surface or its inclination and surface nature the compacting of the imbricate formation 13 in the transfer region of the brim 3 is set. The shape of the guide surface 2 is to be determined depending on the nature of the printed products to be processed. On the guide surface 2 there are present additional guide elements 18 which stabilize and lead the flow of tile printed products 10 in the lateral direction. With the guide element 18, it is the case preferably of projecting guide sheet [metal] which is arranged essentially parallel to the flow direction of the imbricate flow. These guide elements 18 are preferably arranged in an adjustable manner so that they may be set to the width of the printed products 10. The guide elements 18 serve for stabilization of the dynamic flow of the imbricate formation 13. In order to achieve an additional stabilization on standstill of the formation 13, i.e., if the printed

1 products 10 are not in motion, the guide means 18 may be moved toward one another so that the
2 printed products 10 are clamped therebetween and thus are stabilized. Additional elements, e.g.,
3 in the form of laterally engaging pins are conceivable.

4 **[0045]** A further embodiment form with guide means 18 uses laterally arranged conveyor means.
5 With this, it is preferably the case of conveyor belts, conveyor rollers, vacuum belts or brush
6 conveyors. The guide means 18 this time are not arranged in the proximity of the guide surface
7 as shown in the example, but may be arranged also at a constant or variable height next to the
8 guide surface 2.

9 **[0046]** Figure 5 shows an essentially concavely shaped guide surface. 2. The compacting of the
10 printed products located in the region of the brim 3 here differs from the other shown embodiment
11 forms. It may be recognized that due to the geometry of the guide surface 2 and the relatively few
12 supplied printed products, the imbricate formation has a comparatively loose arrangement. The
13 edge 3 is inclined away in the direction of the product flow, so that the frontmost printed sheet has
14 an inclination which is directed to the right, and forms a support for the subsequent printed sheet.

15 **[0047]** As is to be recognized, the printed products 10 are not subjected to abrupt changes in
16 direction, but rather, are constantly and continuously brought into a position which is optimal for
17 isolation and gripping. Byway of an arrangement with which the fold is arranged upward, the
18 printed products may be simply gripped. The guide surfaces are preferably formed by the surfaces

1 of a suitably formed sheet [metal]. The concept based on the flow behaviour and the specific
2 properties of an imbricate flow permits a simple and robust construction. Since one practically
3 requires no quickly moved parts and the printed products are not subjected to an abrupt direction
4 change or mechanical loading, devices according to the invention permit comparatively higher
5 processing speeds. An additional advantage of the invention is manifested in that in particular
6 with folded sheets in the region of the cut-edge side, there arises a greater compression than in the
7 middle or on the fold edge of the folded sheet. The folded sheets have the tendency to extend in
8 the middle region so that the fold edges do not bear tightly on one another, but may be processed
9 in a slightly fanned-open formation, which in particular simplifies the separation or the already
10 described folding-over.

11 **[0048]** The above described embodiment examples have a brim 3 which is directly connected
12 to the guide means. The required abutment however, according to the invention, may also be
13 formed by way of a separate means, for example, a movable sheet [metal] or abutment rods. In
14 this case it is possible to design the abutment in an adjustable manner so that with different product
15 properties (size, flexibility, thickness, etc.) one provides an adjusting possibility, In Figure 5 there
16 is indicated a movable abutment which on removal of a printed sheet is moved in the direction of
17 the arrow M so that the frontmost printed product may also be released on the cut-edge side and
18 thus may be easily removed. The removal means in the embodiment example according to Figure
19 5 comprises a conveyor with which the printed products directly after separation (here not shown
20 in detail) and the removal are conveyed away essentially vertically upward in the direction of

1 arrow H.

2 **[0049]** With particular embodiment forms the brim 3 or the abutment may also be formed by
3 movable elements which convey the printed products in the removal direction so that the removal
4 procedure may be supported in such a manner. With this, a person skilled in the art would provide
5 rollers revolving about a horizontal axis, where appropriate controllable, which minimize and
6 avoid any friction forces of the products to be removed with respect to the brim 3. With
7 particular embodiment forms, with the separation, one may also directly effect a transfer to various
8 removal means, e.g., to various grippers in an alternating manner.

9 **[0050]** In Figure 6 there is shown an alternative embodiment example of the invention. Here
10 the printed products, directly before the separation and removal, are slightly displaced in the
11 direction of arrow S with respect to their main conveying direction P essentially at right angles on
12 the guide surface 2. This transverse shifting may be effected by a simple lift means, for example,
13 a sheet [metal] plating which engages at the side edges of the printed products. Furthermore, the
14 subsequent printed products may be held back in a simple manner by way of a retaining means 29
15 on the fold side. After separation, the printed products are conveyed away by way of the removal
16 means 9 in the manner described above.